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NOTE

THE ASIAN WEED *FATOUA VILLOSA* (MORACEAE) IN NEW YORK STATE AND MASSACHUSETTS

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About 50 years have lapsed since mulberry weed, *Fatoua villosa* (Thunb.) Nakai (Moraceae; Figures 1–9), a native of eastern Asia, was first recognized as an adventive plant in North America. Thieret (1964) reported its discovery in Lafayette, Louisiana, in the early 1960s, and mentioned that plants had also been seen in New Orleans during the previous 15 years. Numerous papers and notes published since 1964 recorded its presence as a weed in all of the southeastern United States (Massey 1975; Vincent 1993, and references cited therein). As summarized by Wunderlin (1997), *F. villosa* is known in an area from Florida west to eastern Texas and north to Oklahoma, Arkansas, Tennessee, Kentucky, southern Ohio, and Virginia. However, it has continued to spread and establish rapidly, and stations north of this area have recently been reported from Missouri (Yatskievych and Raveill 2001) and Michigan (Reznicek 2001). To these, we now add localities in upstate New York and eastern Massachusetts.

SPECIMEN CITATION: U.S.A. New York State: Rensselaer Co., Town of Brunswick, backyard of home on Pennyroyal Lane, 6 mi. east of Troy city center, 42°43′20.4″N, 73°32′58.9″W (GPS-NAD27), 207 m alt.; gravel beneath low deck attached to house, with *Pilea pumila, Veronica serpyllifolia, Glechoma hederacea, Taraxacum* sp., *Oxalis* sp., *Plantago* sp., 3 Sep 2002, *N. G. Miller 14261* (NYS); 21 Oct 2002, *N. G. Miller 14415* (BKL, BH, GH, NY, NYS).

The origin of the New York population is unknown. When first observed, it consisted of about 50 plants growing in an area of 1.5 × 3 m. Six weeks later near the end of October another 10 plants had appeared.

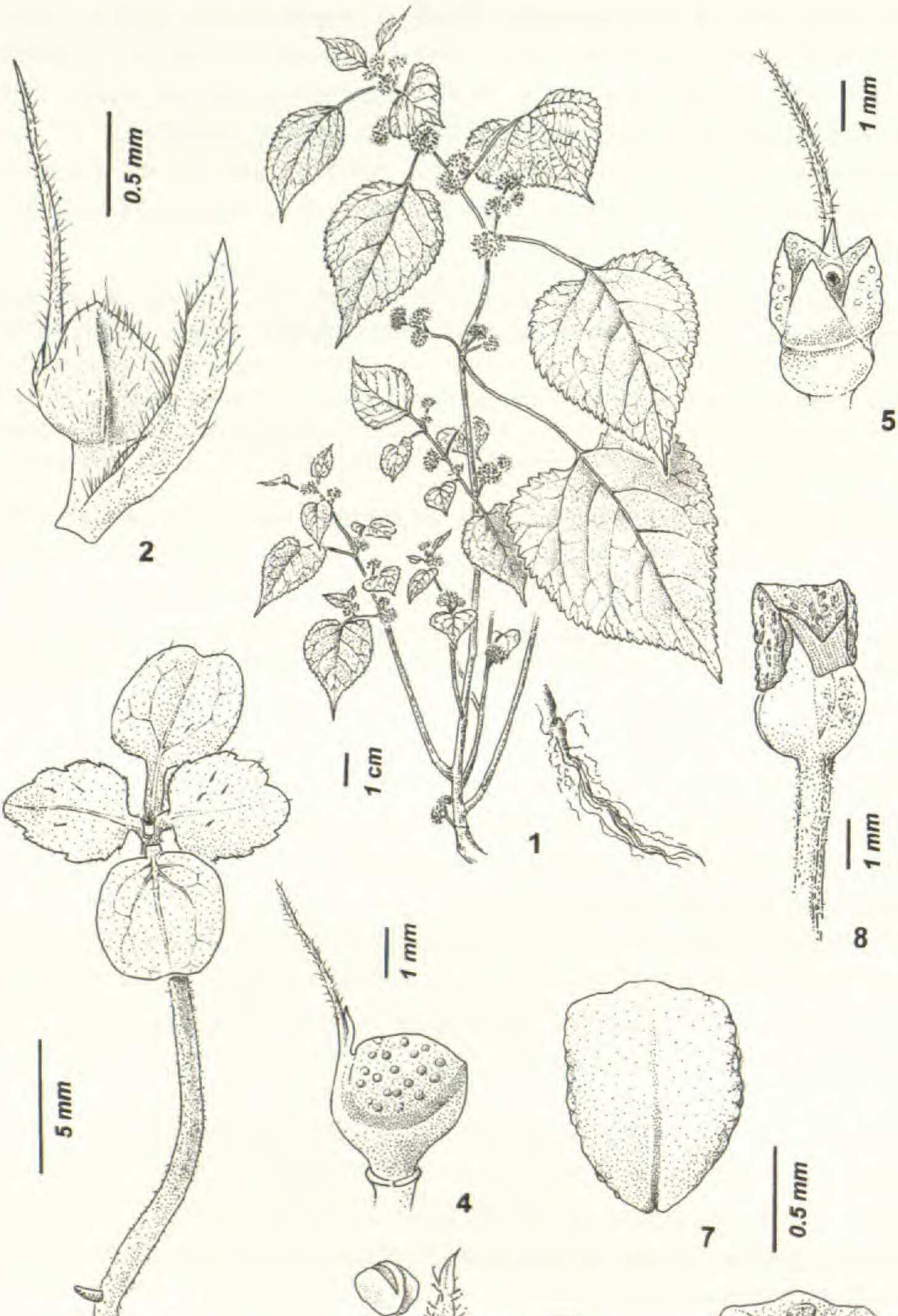
The large size of the population suggests establishment prior to 2002. The deck under which the plants grew is sometimes used as a potting bench, and "seeds" may have been spread from soil associated with nursery stock purchased for outdoor or indoor gardening. It was surprising, however, that *Fatoua* grew nowhere else on the property or indoors with houseplants. Thus the method of introduction of this population remains a mystery.

SPECIMEN CITATION: U.S.A. Massachusetts: Suffolk Co., Boston, South End neighborhood, backyard of home, 64 West Rutland Square, 42°20′30′′N, 71°4′42′′W (United States Geological Survey, 1:25,000 South Boston Quadrangle), plants from seedlings appearing at base of potted plant of *Crassula argentea* brought from Martha's Vineyard, Dukes Co., Massachusetts, and placed out-of-doors on patio in summer of 1993, exserted stigmas violet, 18 Oct 1994, *C. E. Wood, Jr.* (NEBC).

The source of the Boston plants is perhaps somewhat clearer. The minute endocarps of *Fatoua* definitely arrived at this Boston locality in the 8-inch pot of a jadeplant where they germinated after the plant was set outside in sunlight and kept well watered in the summer of 1993. Whether *Fatoua* came with the *Crassula* in its original soil from wherever it was propagated, or from potting soil added later, or from plants of *Fatoua* already present on Martha's Vineyard is not known. Insofar as could be determined, the *Crassula* had been grown indoors for several years but had been set outside in summer. It is conceivable that if *Fatoua* came to Martha's Vineyard with the *Crassula*, mulberry weed may now be naturalized there.

In 1994, seedlings of *Fatoua* appeared in pots of *Hippeastrum* that had been outside near the *Crassula* on the backyard patio in 1993. Subsequently, seedlings have germinated in pots of houseplants placed out in summer and also between the bricks of the patio, along with seedlings of *Viola*, *Astilbe*, *Hosta*, *Polygonum*, *Plantago*, *Senecio vulgaris*, and *Taraxacum* from the surrounding garden and elsewhere. *Fatoua* has not spread to the garden but continues to appear in potted plants. Seedlings appearing in the patio are being removed to prevent further possible spread of this weed that has invaded so widely in the southern United States.

In general habit, *Fatoua villosa* (Figure 1) resembles plants of *Urtica*, or it may be mistaken for young plants of mulberry (*Morus* spp.). The alternate leaves (vs. opposite in *Urtica*) bear scattered, stiff, slender, tapering, hollow, translucent trichomes that arise from the epidermis. Distal portions of the trichome chamber are occluded with a semiopaque substance. Trichomes of this type are most abundant on the upper (Figure 9) and lower leaf surfaces and are similar in general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appearance to the urticating hairs of stinging nettles (*Urtica* spp.). Although in *Fatoua* hairs of this type do not sting, they misleadingly suggest an urticaceous relationship. Careful dissection of the minute carpellate flower will show that the stigma consists of two arms, one short and inconspicuous, the other long and extending beyond a four-part perianth (Figures 2, 4). Members of the Urticaceae, in contrast, have one stigma. Stems of *F. villosa* have one to three-celled hooked hairs, and small glandular trichomes occur on flower and inflorescence parts (Figures 2, 3).

Several other points of biological interest are presented here to supplement the incomplete description of this plant in floras and other sources. The inflorescences are congested axillary cymes in which bracteate staminate (Figure 3) and carpellate (Figure 2) flowers occur intermingled. Staminate flowers appear to discharge pollen explosively, although we have not seen this in action. Liquid-preserved flowers at pre- and post-anthesis show that filament orientation changes from inwardly arched to reflexed in opened flowers. This configuration and the presence of transverse creases on adaxial surfaces of filaments (Figure 3) is paralleled in flowers of various Urticaceae in which explosive pollen discharge is well known (Mosebach 1932; see also illustrations in Miller 1971).

Fruit development is poorly understood in this plant. Fertile carpellate flowers produce one seedlike reproductive unit inside an ovary that develops unequally. The base of the ovary wall at maturity is a fleshy, saddle-shaped gynobase in which the endocarp rests (Figure 4). Above and lateral to the gynobase, the ovary wall is thin and translucent and remains closely appressed to the endocarp until the lateral walls separate along an apical suture to release the endocarp (Figure 5), which contains

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Figures 1–9. *Fatoua villosa*. 1. Habit of plant in flower, note axillary congested cymules. 2. Carpellate flower near or at anthesis, two of four valvate tepals shown. 3. Staminate flower immediately after anthesis, constrictions in filaments suggest that pollen is explosively dispersed. 4. Immature ovary, showing fleshy gynobase and thin apical ovary wall appressed to developing tuberculate endocarp, note short stigma arm. 5. Ovary immediately after release of endocarp, gynobase saddle-shaped, thin dehiscent ovary walls lateral, perianth not shown. 6. Endocarp, abaxial view, "seed" scar at top, note tuberculate walls. 7. Same endocarp, adaxial view. 8. Seedling at germination, cotyledons emerging from endocarp and seed coat. 9. Young seedling. (Illustrations by Patricia Kernan, New York State Museum; 1–7 from living or liquid-preserved material vouchered by *Miller 14415*; 8 & 9 from plants collected by C. E. Wood, Jr., in Boston, Massachusetts.)

a single seed. Sanders (1996) indicated that endocarp release is explosive. We have not confirmed this, but note that in liquid-preserved material the shape and size of the gynobase does not change after the endocarp is lost. If forceful release does occur, evidence of the mechanism should be apparent in the gynobase. The seed coat is thin (Yamazaki 1982) and can be seen beneath the wall of the endocarp during cotyledon emergence (Figure 8). We consider the seedlike diseminules of *Fatuoa* (Figures 6, 7) to be single-seeded endocarps.

Fatoua villosa has spread rapidly northward in the eastern United States mainly in association with the transportation of nursery stock from southern sources. While widespread throughout the eastern United States, *Fatoua* appears at present to be of local occurrence. The invasive potential of the species, however, remains uncertain (Yatskievych and Raveill 2001), at least in the North. Because frost kills plants of *Fatoua*, persistence out-of-doors in the northern United States depends on the rapid buildup of seed banks. Our observations in New York and Massachusetts indicate that populations can persist for some years, overwintering as dispersed seedlike endocarps. *Fatoua villosa* is a short-day annual that fruits in abundance beginning late in the summer and continuing until the first killing frost. Young plants as short as 8 cm can be found with inflorescences early in the autumn.

The species is an acknowledged pest in commercial greenhouses and nurseries in the southeastern United States (Wright 1988), where plants established in gardens are also frequently reported. Its weedy tendencies in outdoor plantings are apparent. However, with the exception of discoveries of plants growing in a mesic forest in Missouri (Yatskievych and Raveill 2001) and a construction site (Wright 1988), the species does not yet appear to have spread widely from plantings or gardens. It will be worthwhile to continue tracking the spread of *Fatoua villosa* in the southeastern United States in places where the climate is favorable to its growth, and to establish whether northern populations can persist outdoors.

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